

## GENERAL BIOTIC RELATIONS OF THE FLORIDA MAMMAL FAUNA<sup>1</sup>

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The first version of this paper was presented by the author at the 1951 meetings of the Florida Academy of Sciences. This was part of a symposium on "The Biotic Position of Florida" arranged by Dr. H. Arliss Denyers, Chairman of the Biological Sections of these meetings. The following year (Sherman, 1952), "A list and bibliography of the mammals of Florida, living and extinct," was published in this journal. In the following pages an attempt is made to describe in general terms and with little technical language the relationships in time and space of the families and genera of mammals which have been recorded from Florida and to bring up to date the list of recent mammals. Literature essential to this paper is cited to supplement the bibliography published in 1952. However, no attempt has been made to make this bibliography complete.

The biotic relations of the terrestrial mammal fauna of Florida is of unusual interest due to the preservation of many fossil forms since Miocene times and to the geological history of this part of the country. Geographic changes since the last ice age of the Pleistocene have isolated many terrestrial populations. Also the Florida peninsula is extensive and its various habitats have provided conditions under which the differentiation of species and geographic races has flourished. The extensive shore line has furnished numerous records of marine forms.

Counting fossils, 148 genera of mammals have been recorded from Florida (Table 1). The most ancient of these, *Basilosaurus*, an extinct, toothed whale, has the distinction of being the only mammal in this list of Eocene age. None are known from the Oligocene, but there are 43 or 44 from the Miocene, 16 or 17 from the Pliocene, 58 from the Pleistocene and a like number are listed as Recent. However, the latter group includes the bison and Florida wolf, both of which are now extinct in Florida, 10 genera of bats, 14

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genera of whales and the introduced house rat, house mouse and armadillo. The relatively small number of genera recorded from the Pliocene probably indicates that correspondingly favorable collecting localities for this age have not been located, as compared with those for the Miocene and Pleistocene.

The record of the Miocene fauna of Florida is remarkable in that it furnishes most of the records of Miocene mammals in North America east of the 95th meridian. Among these are represented the following six families, four of which became extinct before the Pliocene. The Mylagaulidae and Protoceratidae are the exceptions. The Mylagaulidae were stout bodied rodents, which suggests that they burrowed like pocket gophers. Rhinoceros-like horns were present on the nose of some of these. The Entelodontidae consisted of giant pigs with a shoulder hump. Some stood as much as six feet high and were ten feet long. Like many modern artiodactyls they possessed only two toes on each foot. The Hypertragulidae were a kind of pigmy deer, with tusklike canine teeth. The Protoceratidae were larger and some, presumably males, possessed two pairs of giraffe-like horns. Little is known of the Nothokematidae, but they were probably somewhat similar to the protoceratids. Evidence that oreodonts of the family Merycoidodontidae lived in Florida consists of a single tooth. Members of these families are known from North America only, with the exception of the giant pigs, which also occurred in the Oligocene of Europe and Asia.

Among the marine mammals recorded from the Florida Miocene are members of two families of whales, which became extinct in the Pliocene. These are the Acrodelphidae, the long-beaked porpoises and the Cetotheridae. The latter were primitive whalebone whales. Although it is generally believed that the whale-bone whales were derived from toothed whales, teeth were lacking in these cetotherids.

*Goniodelphis hudsoni*, the only Florida representative of the river dolphin family, Platanistidae, is of uncertain age, but is either from the Miocene or Pliocene. River dolphins are now confined chiefly to the fresh water rivers and lakes of South America and Asia. Their occurrence in the Miocene of Europe, North and South America indicates how extensive their wanderings have been.

Among the Sirenia, dugongs, which are now found in the Red Sea and Indian Ocean, have an ancient history which extends back to the Eocene of Europe and Africa. They are known from the

Miocene of Florida and apparently became extinct in North America and Europe before Pleistocene times. Their relatives, the manatees, which comprise the family Trichechidae, did not appear until the Pleistocene. They now live in the warmer parts of the Atlantic Ocean along the coasts of the Americas and Africa. They are also occasionally found in fresh water, such as the St. Johns and Suwannee Rivers.

The following six families of mammals, which are represented in the Florida Miocene, no longer live in this region. The Heteromyidae, which includes the present day pocket rats and mice, spiny mice and kangaroo rats and mice, has no modern representatives in eastern North America, but is abundantly represented in suitable regions in the western part of the continent. Although they have lived in North America since the Oligocene, they have only recently extended their range into South America. Horses of the family Equidae and members of the Rhinocerotidae, Tapiridae and Camelidae occurred in North America from the Eocene to the Pleistocene, with the exception of the rhinoceroses, which disappeared in the Pliocene. Horses and rhinoceroses were also represented in the Eocene of the Old World. It is interesting to speculate on what trails they used and what ecological factors existed which exterminated New World forms and allowed others to survive in parts of Europe, Asia and Africa. Tapirs had reached Asia by the Miocene, but like many other groups, did not reach South America until the Pleistocene. Members of the Camelidae, which reached South America in the Pleistocene, have persisted in the form of the various kinds of llamas, alpacas, vicunas and guanacos. During the Pleistocene other members of the Camelidae apparently reached Europe, Asia and Africa. Of these only the camel and dromedary of Asia have survived. Peccaries of the family Tayassuidae lived in Florida from Miocene to Pleistocene times, but now occur in Texas, Central and South America.

The other five families of mammals represented in the Florida Miocene are still thriving. The histories of the dog family, Canidae, and of the weasel family, Mustelidae, extend back to the Eocene and Oligocene of North America, Europe and Asia. In the Pliocene or Pleistocene members of these groups reached South America and Africa. The deer of the family Cervidae had primitive predecessors in the Oligocene of Europe and Asia. By the Miocene they were in North America and reached South America in the Pleisto-

TABLE 1

Distribution in time and space of the families and genera of mammals recorded from Florida. Florida records are *in italics*. Distribution is chiefly after Simpson, 1945. A= Asia; C= Central America; E= Europe; F= Africa; G= Galapagos; I= West Indies; M= Madagascar; N= North America; S= South America; T= Australia; W= World wide.

| Family or genus                                  | Eocene | Oligocene | Miocene | Pliocene | Pleistocene | Recent      |
|--|--------|-----------|---------|----------|-------------|-------------|
| Order Marsupialia.                               |        |           |         |          |             |             |
| Didelphidae.—Opossums                            | S NE   | S NE      | S NE    | S        | SCN<br>SCN  | SCN<br>SCN  |
| Didelphis. Common opossum                        |        |           |         |          |             |             |
| Order Insectivora.                               |        |           |         |          |             |             |
| Soricidae.—Shrews                                |        | NE        | NE      | NEA      | NEA         | NEAF<br>NEA |
| Sorex. Long-tailed shrews                        |        | ?         | E       | NE       | NE          | NEA         |
| Blarina. Short-tailed shrews                     |        |           |         | N        | N           | N           |
| Cryptotis. Short-tailed shrews                   |        |           |         |          | N           | SCN         |
| Talpidae.—Moles                                  | E      | NE        | NE      | NE       | NE          | NEA         |
| Scalopus. Eastern American moles                 |        |           |         | N        | N           | N           |
| Order Chiroptera.                                |        |           |         |          |             |             |
| Phyllostomidae.—American leaf-nosed bats         |        |           |         |          |             | SCN<br>I    |
| Artibeus. American fruit bat                     |        |           |         |          |             | SCN<br>I    |
| Vespertilionidae.—Boreal bats, etc.              |        | E         | NE      | NE       | SCNEA       | SCNEA W     |
| Myotis. Little brown bats or myotis              |        | E         | E       | E        | NE          | SCNEA W     |
| Pipistrellus. Pipistrelles                       |        |           |         |          | N           | CNEA        |
| Eptesicus. Big brown bats                        |        |           |         |          | N A         | SCN W       |
| Nycticeius. Rafinesque bat                       |        |           |         |          |             | N           |
| Lasiurus. Red bat, Seminole bat, hoary bat, etc. |        |           |         |          |             | I           |
| Dasypterus. Yellow bat                           |        |           |         |          |             | I           |
| Corynorhinus. Big eared bat                      |        |           |         |          |             | I           |
| Suapteneus                                       |        |           | N       |          |             | N           |
| Mionyotis  |        |           | N       |          |             |             |
| Molossidae.—Free-tailed bats                     |        | E         | E       |          |             |             |
| Molosses   |        |           | E       | E        | NE          | SCNEA W     |
| Tadarida. Free-tailed bats                       |        | E         | E       | E        | N           | SCNEA W     |
| Eumops. Mastiff bats                             |        |           |         |          | E           | SCN I       |



TABLE 1—Continued

| Family or genus                                     | Eocene | Oligo-<br>cene | Miocene | Plio-<br>cene | Pleis-<br>tocene | Recent        |
|---|--------|----------------|---------|---------------|------------------|---------------|
| Order Primates.                                     |        |                |         |               |                  |               |
| Hominidae.—Men                                      |        |                |         |               |                  |               |
| Homo. Men   |        |                |         |               | N                | W<br>N        |
| Order Edentata.                                     |        |                |         |               |                  |               |
| Megalonychidae                                      |        |                |         |               |                  |               |
| Megalonyx. Ground sloth                             | ?      | S              | S       | SCN           | SCN              | I             |
| Megatheriidae                                       |        |                | S       | SCN           | N                |               |
| Megatherium. Ground sloth                           |        |                |         | SCN           | SCN              |               |
| Mylodontidae  |        | ?              | S       | S             | SCN              |               |
| Paramylodon. Ground sloth                           |        |                |         |               | SCN              |               |
| Thinobadistes. Ground sloth                         |        |                |         |               | N                |               |
| Glyptodontidae                                      |        |                |         |               | N                |               |
| Boreostracon. A glyptodont                          | S      | S              | S       | SCN           | SCN              |               |
| Dasypodidae.—Armadillos                             | S      | S              | S       | S             | N                |               |
| Holmesina. Giant armadillo                          |        |                |         |               | SCN              | SCN           |
| Dasypus. Texas armadillo, etc.                      |        |                |         |               | N                | SCN           |
| Order Lagonomorpha.                                 |        |                |         |               |                  |               |
| Leporidae.—Rabbits, etc.                            |        |                |         |               |                  |               |
| Sylvilagus. Cottontails, marsh rabbits, etc.        | N      | NEA            | NEA     | NEA<br>?      | SCNEAF<br>SCN    | SCNEAF<br>SCN |
| Order Rodentia                                      |        |                |         |               |                  |               |
| Mylagaulidae  |        |                |         |               |                  |               |
| Mesogaulus  |        |                |         |               |                  |               |
| Sciuridae.—Squirrels, marmots, chipmunks, etc.      |        |                | N       | N             |                  |               |
| Sciurus. Tree squirrels                             |        |                | N       |               |                  |               |
| Glaucomys. American flying squirrels                |        |                | NE      | NE            | NEA              | SCNEAF        |
| Geomysidae.—Pocket gophers                          |        |                |         |               | NE               | SCNE          |
| Plesiothomomys. A western pocket gopher in the east | N      | N              | N       | N             | N                | N             |
| Geomys. Eastern pocket gophers                      |        |                |         |               | N                | N             |
| Heteromyidae.—Kangaroo and pocket rats              | N      | N              | N       | N             | N                | SCN           |
| Proheteromys  |        |                | N       | N             |                  |               |

TABLE 1—Continued

| Family or genus                                 | Eocene | Oligo-<br>cene | Miocene       | Plio-<br>cene | Pleis-<br>tocene          | Recent                             |
|---|--------|----------------|---------------|---------------|---------------------------|------------------------------------|
| Castoridae.—Beavers                             |        |                |               |               |                           |                                    |
| Castor. Beavers                                 |        |                |               | NEA<br>NEA    | NEA<br>NEA                | NEA<br>NEA                         |
| Castoroides. Giant beavers                      |        |                |               |               |                           |                                    |
| Cricetidae.—New World rats and mice             |        | NEA            | NEA           | S NEA         | SCNEA<br>SCN <sup>G</sup> | SCNEAFM<br>SCN <sup>G</sup><br>SCN |
| Oryzomys. Rice rats                             |        |                |               |               |                           |                                    |
| Reithrodontomys. Harvest mice                   |        |                |               | N             | N                         | N                                  |
| Peromyscus. White-footed mice, deer mice, etc.  |        |                |               | N             | N                         | SCN                                |
| Sigmodon. Cotton rats                           |        |                |               | N             | N                         | N                                  |
| Neotoma. Wood rats                              |        |                |               | N             | N                         | N                                  |
| Synaptomys. Bog lemming mice                    |        |                |               |               | NEA                       | NEA                                |
| Pitymys. Pine mice                              |        |                |               | N             | N                         | N                                  |
| Ondatra. Flat-tailed muskrat                    |        |                |               |               |                           |                                    |
| Neofiber. Round-tailed muskrat, water rat       |        |                |               | EA<br>P       | EA T<br>A                 | EA TW<br>W<br>W                    |
| Muridae.—Old World rats and mice                |        |                |               | P             | EA                        | N<br>W<br>W                        |
| Rattus. House rats, roof rats, black rats, etc. |        |                |               | S N<br>N      | SCN<br>N                  | SCN<br>N                           |
| Mus. House mice, etc.                           |        |                | S             | S             | SCN                       | SC                                 |
| Erethizontidae.—Tree porcupines                 | S      |                |               |               |                           |                                    |
| Erethizon. North American tree porcupines       |        |                |               |               |                           |                                    |
| Hydrochoeridae.—Capybaras                       |        |                |               |               |                           |                                    |
| Neochoeerus. Giant capybara                     |        |                |               |               |                           |                                    |
| Hydrochoerus. Capybaras                         |        |                |               |               |                           |                                    |
| Order Carnivora.                                |        |                |               |               |                           |                                    |
| Canidae.—Wolves, dogs, etc.                     |        | NEA<br>N       | NEA<br>N<br>N | NEA           | SCNEAF                    | SCNEAFT                            |
| Daphaenus                                       |        |                |               |               |                           |                                    |
| Tomarctus                                       |        |                |               |               |                           |                                    |
| Canis. Wolves, dogs, jackals, etc.              |        |                |               | N<br>N        | NEA<br>NEA<br>N           | N<br>NEAF<br>SCN                   |
| Vulpes. Red fox, kit fox, etc.                  |        |                |               |               |                           |                                    |
| Urocyon. Gray fox                               |        |                |               |               |                           |                                    |
| Amphicyon                                       |        | E              | NEA<br>N      | EA<br>N<br>N  |                           |                                    |
| Aelurodon                                       |        |                |               |               |                           |                                    |
| Pliogulo  |        |                |               |               |                           |                                    |
| Cynodesmus                                      |        |                | N<br>N        |               |                           |                                    |
| Tennocyon                                       |        | N              |               |               |                           |                                    |

TABLE 1—Continued

| Family or genus                             | Eocene | Oligo-<br>cene | Miocene  | Plio-<br>cene | Pleis-<br>tocene     | Recent       |
|---|--------|----------------|----------|---------------|----------------------|--------------|
| Ursidae.—Bears                              |        |                |          |               |                      |              |
| Agriotherium. Bear-dog                      |        |                | E        | NEA<br>NEA    | SCNEA<br>A           | SCNEA        |
| Arctodus. Short-faced bear                  |        |                |          |               | N                    |              |
| Euarctos. Black and cinnamon bears, etc.    |        |                |          | E             | NEA                  | NEA          |
| Procyonidae. Raccoons, coatis, pandas, etc. |        |                | NE       | SCNEA<br>N    | SCN A<br>SCN         | SCN A<br>SCN |
| Procyon. Raccoons                           |        |                |          |               | SCNEAF               | SCNEAF       |
| Mustelidae.—Weasels, skunks, otters, etc.   |        | NEA            | NEA<br>N | NEAF          |                      |              |
| Aelurocyon                                  |        |                | N        |               |                      |              |
| Oligobunus                                  |        |                | N        |               |                      |              |
| Mephitaxus                                  |        |                | N        |               |                      |              |
| Leptarctus                                  |        |                | N        |               |                      |              |
| Mustela. Weasel, mink, etc.                 |        |                | NE       | N<br>NEA      | SCNEA<br>N           | SCNEAF<br>N  |
| Mephitis. Striped skunks                    |        |                |          |               | N                    | N            |
| Spilogale. Spotted skunks                   |        |                |          |               | SCNEA                | SCNEAF       |
| Lutra. Otters                               |        |                |          |               |                      |              |
| Miomustela                                  |        |                | N        | NEA           |                      |              |
| Felidae.—Cats, jaguars, etc.                | E      | NE             | NEAF     | NEA<br>?EA    | SCNEAF               | SCNEAF       |
| Felis. Puma, domestic cat, etc.             |        |                |          | EA            | SCNEAF               | SCNEAF       |
| Panthera. Jaguar                            |        |                |          |               | SCN                  | SCN AF       |
| Smilodon. Saber-tooth tiger                 |        |                |          |               |                      |              |
| Lynx. Bobcat, lynx                          |        |                |          |               | SCN<br>N             | NEAF         |
| Order Proboscidea.                          |        |                |          |               |                      |              |
| Gomphotheriidae.—Mastodons                  |        | F              | NEAF     | NEA           | SCN A                |              |
| Serridentinus. Serrate-toothed mastodon     |        |                | NEA      | N A           |                      |              |
| Mammutiidae.—Mastodons                      |        |                | NE F     | NEA           | N                    |              |
| Mammut. Mastodon                            |        |                | NE F     | NEA           | N                    |              |
| Elephantidae.—Mammoths, elephants           |        |                |          | EA            | ? ? NEAF<br>? ? NEAF | AF           |
| Mammuthus. Mammoth                          |        |                |          |               |                      |              |

TABLE 1—Continued

| Family or genus                             | Eocene | Oligo-<br>cene | Miocene    | Plio-<br>cene | Pleis-<br>tocene | Recent   |
|---|--------|----------------|------------|---------------|------------------|----------|
| Order Perissodactyla.                       |        |                |            |               |                  |          |
| Equidae.—Horses, asses, zebras              |        |                |            |               |                  |          |
| Anchitherium. Three-toed horses             | NE     | NE             | NEA<br>NEA | NEAF          | SCNEAF           | EAF      |
| Archaeohippus. Three-toed horses            |        |                | N          |               |                  |          |
| Parahippus. Three-toed horses               |        |                | N          |               |                  |          |
| Merychippus. Three-toed horses              |        |                | N          |               |                  |          |
| Miohippus. Three-toed horses                |        | N              |            |               |                  |          |
| Nannippus. Three-toed horses                |        |                |            | N             |                  |          |
| Neohipparion. Three-toed horses             |        |                |            | N             |                  |          |
| Hipparion. Three-toed horses                |        |                |            | NEAF          |                  |          |
| Equus. One-toed horses, asses, zebras, etc. |        |                |            | NEAF          |                  |          |
| Tapiridae.—Tapirs                           | N      | NE             | NEA        | NEA           | SCNEAF<br>SCNEA  | EAF<br>A |
| Tapiravus                                   |        |                | N          |               |                  |          |
| Tapirus. Tapirs                             |        |                | ?          | EA            | SCNEA            | A        |
| Rhinocerotidae.—Rhinoceroses                | NEA    | NEA            | NEAF       | NEAF          | EAF              | AF       |
| Caenopus                                    |        | N              | N          |               |                  |          |
| Diceratherium                               |        | N              | N          |               |                  |          |
| Teloceras                                   |        |                | N          | N             |                  |          |
| Aphelops                                    |        |                | N          | N             |                  |          |
| Order Artiodactyla.                         |        |                |            |               |                  |          |
| Entelodontidae.—Giant pigs                  | N ?    | NEA            | N          |               |                  |          |
| Daeodon                                     |        |                | N          |               |                  |          |
| Tayassuidae.—Peccaries                      |        | N              | N          | N             | SCN              | SCN      |
| Floridachoerus                              |        |                | N          |               |                  |          |
| Prosthennops                                |        |                | N          | N             |                  |          |
| Platygonus                                  |        |                |            | N             | SCN              |          |
| Mylohyus                                    |        |                |            |               | N                |          |
| Tayassu. Modern peccaries                   |        |                |            |               | SCN              |          |
| Merycoidodontidae.—Oreodonts                | N      | N              | N          | N             |                  | SCN      |
| Genus undetermined                          |        |                |            |               |                  |          |



TABLE 1—Continued

| Family or genus                            | Eocene | Oligo-<br>cene | Miocene | Plio-<br>cene | Pleis-<br>toene | Recent        |
|--|--------|----------------|---------|---------------|-----------------|---------------|
| Camelidae.—Camels, llamas, etc.            |        |                |         |               |                 |               |
| Oxydactylus. Giraffe—camel                 | N      | N              | N       | N             | SCNEAF          | S A           |
| Miolabis. Giraffe—camel                    |        |                | N       |               |                 |               |
| Megatylopus. Extinct camel                 |        |                | N       | N             |                 |               |
| Procamelus                                 |        |                |         |               |                 |               |
| Tanupolama                                 |        |                | N       |               |                 |               |
| Camelops                                   |        |                |         |               | N               |               |
| Hypertragulidae.—Primitive                 |        |                |         |               | N               |               |
| Floridatragulus pigny                      | N A    | N              | N       |               |                 |               |
| Leptomeryx deer                            |        | N              | N       |               |                 |               |
| Hypernekops                                |        |                | N       |               |                 |               |
| Nothokeniidae.—Primitive deer              |        |                | N       |               |                 |               |
| Nothokenas                                 |        |                | N       |               |                 |               |
| Protoceratidae                             |        |                | N       |               |                 |               |
| Synthetoceros                              |        | N              | N       | N             |                 |               |
| Syndyoceras                                |        |                | N       |               |                 |               |
| Cervidae.—Deer, elk, moose, etc.           |        |                | N       |               |                 |               |
| Machaeromeryx                              |        | EA             | NEA     | NEA           | SCNEA           | SCNEA         |
| Blastomeryx                                |        |                | N       |               |                 |               |
| Dromomeryx                                 |        |                | N       |               |                 |               |
| Blastocercus. Pampas deer                  |        |                |         |               |                 |               |
| Cervus. Elk, sambar, etc.                  |        |                |         | EA            | SCN             | S             |
| Odocoileus. Deer                           |        |                |         |               | NEA             | NEA           |
| Bovidae.—Bison, cattle, sheep, goats, etc. |        |                |         | EA            | SCN             | SCN           |
| Bison. Wisent, bison                       |        |                | E       | EA            | NEAF            | NEAF          |
|  |        |                |         |               | NEA             | NE            |
| Order Sirenia.                             |        |                |         |               |                 |               |
| Dugongidae.—Dugongs                        | E F    | E              | NEA     | NEA           |                 | Red sea, etc. |
| Hesperosiren                               |        |                | N       |               |                 |               |
| Felsinotherium                             |        |                |         | NE            |                 |               |
| Trichechidae.—Manatees                     |        |                |         |               | SCN             | F             |
| Trichechus. Manatee                        |        |                |         |               | SCN             | F             |
| Order Pinnipedia.                          |        |                |         |               |                 |               |
| Phocidae.—Seals                            |        |                |         |               |                 |               |
| Monachus. Monk seal                        |        |                | N       | N F           | N               | All seas      |
| Cystophora. Hooded seal                    |        |                |         |               |                 | Pacific N     |
|  |        |                |         |               |                 | I             |

TABLE 1—Continued

| Family or genus  | Eocene | Oligo-<br>cene | Miocene | Plio-<br>cene | Pleis-<br>tocene | Recent     |
|--|--------|----------------|---------|---------------|------------------|------------|
| Order Cetacea.   |        |                |         |               |                  |            |
| Basilosauridae.—Archiac whales                         |        |                |         |               |                  |            |
| Platanistidae.—River dolphins                          | N      | E              | S NE    | S N           | S N              | S A        |
| Goniodelphis   | N      |                | ?       | ?             |                  |            |
| Ziphiidae.—Beaked whales                               |        |                | S NE    | E             |                  | All oceans |
| Mesoplodon. Gervais' whale                             |        |                | NE      | E             |                  | All oceans |
| Ziphius. Two-toothed whales                            |        |                | NE      |               |                  | All oceans |
| Physeteridae.—Sperm whales                             |        |                | S NE    | NE            | T N              | All oceans |
| Physeter. Cachalot                                     |        |                | NE      |               | N                | All oceans |
| Hoplocetus   |        |                | E       | N             |                  |            |
| Kogiopsis  |        |                |         | N             |                  |            |
| Kogia. Pigmy sperm whale <sup>1</sup>                  |        |                |         |               |                  | N          |
| Acrodelphidae.—Long-beaked porpoises                   |        |                | NE      | N             |                  |            |
| Pomatodelphis  |        |                | NE      | N             |                  |            |
| Schizodelphis  |        |                | NE      | NE            |                  |            |
| Delphinidae.—Dolphins, porpoises, killer whales        |        |                | NE      | NE            | NE               | All seas   |
| Megalodelphis  |        |                | N       | NE            |                  |            |
| Globicephala. Pilot whales, black fish <sup>2</sup>    |        |                |         |               | N                | N          |
| Steno.—Rough-toothed dolphins <sup>2</sup>             |        |                |         | E             |                  | N          |
| Stenella. Spotted, bridled dolphins, etc. <sup>3</sup> |        |                |         |               |                  | N          |
| Delphinus. Common dolphins                             |        |                |         | E             |                  | All N seas |
| Tursiops. Bottle-nosed dolphins <sup>2</sup>           |        |                |         | E             |                  | N          |
| Grampus. Killer whale <sup>2</sup>                     |        |                |         |               |                  | N          |
| Pseudorca. False killer                                |        |                |         | EA            |                  |            |
| Cetotheriidae.—Extinct whale-bone whales               |        | E              | S NE    | E             |                  |            |
| Isocetus   |        |                | NE      |               |                  |            |
| Mesocetus  |        |                | NE      |               |                  |            |
| Balaenopteridae.—Whale bone whales                     |        |                | N       |               |                  |            |
| Balaenoptera. Rorqual, finback, pike whales, etc.      |        |                |         | NE            | N                | All seas   |
| Megaptera. Hump-backed whales                          |        |                |         | NE            | N                | All seas   |
| Balaenidae.—Whale-bone whales                          |        |                |         | NE            |                  |            |
| Eubalaena. Right whale <sup>4</sup>                    |        |                |         | E             | S                | All oceans |

<sup>1</sup> Atlantic, Pacific and Indian Oceans.<sup>2</sup> All seas except Arctic.<sup>3</sup> Atlantic and Pacific oceans.<sup>4</sup> All oceans except Arctic.

cene. Porpoises of the family Delphinidae, which are now found in all oceans, are first recorded from the Miocene of North America and Europe. Bats are not often found as fossils, possibly due to their light weight and small size. However, members of the Vespertilionidae have been found in the Oligocene of Europe and the Miocene of North America. Like terrestrial mammals, they apparently did not reach South America until the Pleistocene. Most of the species of bats which live in the colder regions belong to this family.

In the Pliocene and Pleistocene certain kinds of mastodons and mammoths lived in Florida. Members of the Gomphotheridae, serrate-toothed mastodons, lived in other parts of North America, Europe, Asia and Africa in the Miocene. The earliest record for these animals is from the Oligocene of Africa. However, they are unknown from Africa in the Pliocene, during which age they occurred in Florida. Other members of this group lived in the Pleistocene of North and South America, Europe and Asia, but none survived that age. Other mastodons of the family Mammutidae, whose known history starts with the Miocene of North America, Europe and Africa, are known from the Pliocene and Pleistocene of Florida. The earliest records for the Elephantidae are from the Pliocene of Europe and Asia. Others were in North America and Africa in the Pleistocene, including the mammoths which lived in Florida. The only remnant of the large assortment of these great beasts of past ages are the elephants, now restricted to parts of Asia and Africa.

Carnivores which meet the requirements of the bear family, Ursidae, appeared in the Miocene of North America, Europe and Asia. Representatives of this family have lived in Florida since the Pliocene. Bears reached South America in the Pleistocene.

The records of Pleistocene mammals shows that, with the exceptions of bats and whales, all but one of the genera of mammals now living in Florida were represented. The exception is that for the North American flying squirrels, *Glaucomys*.

Certain genera of mammals apparently lived in Florida only during Pleistocene times. A number of edentates belong in this category. They had a long history in South America and arrived in North America in the Pliocene or Pleistocene. These consist of four genera of ground sloths, representing three families, a glyptodont and a giant armadillo. Giant mammals were not rare in

this age. Some of the ground sloths were as large as elephants. A representation of *Megatherium* figured in Scott's History of the Land Mammals of the Western Hemisphere, shows one resting on its hind feet and strong tail, while it is pulling the limb of a tree within reach of its mouth with the strong claws of its fore feet. These claws were curved and they walked on the knuckles of their fore feet rather than placing the palm of the foot on the ground. The glyptodonts looked more like large tortoises than mammals. The shell was formed of many pieces of bone, which dovetailed together to form a strong armor. The tail was also heavily armored and in some species it terminated in a spiked enlargement suggestive of a warclub. Although the modern capybara, *Hydrochoerus*, of South and Central America, is now the largest of living rodents, an even larger variety, *Neochoerus*, was present in the Pleistocene. Another large rodent, the beaver, also had a giant relative, *Castoroides*, which is known only from the Pleistocene of North America. Although beavers, *Castor*, have undoubtedly lived in this part of the country since Pleistocene times, they were nearly exterminated by trapping. They are again becoming established in the western part of the state. Beavers are northern animals and also live in Europe and Asia. Two genera of carnivores, which are known only from the Pleistocene are *Arctodus*, the short-faced bears and *Smilodon*, the saber-tooth tiger. The upper canine teeth of *Smilodon* are long and knife-like. The mouth could be opened very wide and it is believed that they used these teeth to stab and slash. Possibly mastodons and mammoths were their favorite bill of fare.

Eleven genera of mammals, which are recorded for Florida in the Pleistocene, no longer live here, but are represented in other regions. Those which now occur in colder climates include genera for the elk, *Cervus*; red fox, *Vulpes*; flat-tailed muskrat, *Ondatra*; a bog lemming mouse, *Synaptomys*; a western pocket gopher, *Plesiothomomys*; and the North American porcupine, *Erethizon*. Those which are now native to Mexico, Central and or South America consist of *Hydrochoerus*, the capybara; *Panthera*, the jaguar; *Tapirus*, the tapir; *Blastoceros*, the pampas deer; and *Dasyurus*, the armadillo. Within the past thirty years the Texas armadillo has been introduced into the state and is again well established in the warmer regions.

The ten genera of modern bats recorded from Florida belong to



three families. In the Phyllostomidae recorded from Florida a leaf-like projection is present on the nose. *Artibeus*, the only genus of this family recorded from Florida, is probably an occasional visitor from Cuba. The Molossidae are characterized by the fact that about half of the tail is free. Of the two genera of free-tailed bats which live here, *Tadarida* is represented in the warmer countries of all parts of the world. The other genus, *Eumops*, is known from south Florida, Cuba, Jamaica and in scattered localities from Brazil to California. In the Vespertilionidae no leaf-nose is present and the tail is nearly or completely enclosed in the interfemoral membrane. Four of our species of vespertilionid bats belong to the closely allied genera *Lasiurus* and *Dasypterus*. Members of these genera are confined to the Americas and their geographic ranges are suggestive of the summer and winter ranges of many species of birds. It is also interesting to note that *Lasiurus cinereus*, the hoary bat, comes south only during the colder months after having reared their offspring in the northern United States and Canada. Three other genera, *Myotis*, *Pipistrellus* and *Eptesicus* are widely distributed in many parts of the world, including Australia. The big-eared bat, *Corynorhinus*, is restricted to North America, but closely related forms live in Europe, Asia and north Africa. The evening bats of the genus *Nycticeius* are known from the eastern United States, Cuba and Mexico.

Some genera of mammals, which live in this region, are widely distributed even though they are unable to fly. A few are almost confined to the state. *Mustela*, the weasels and mink, and *Lutra*, the otters, have close relatives in North and South America, Europe, Asia and Africa. The relatives of the bobcat, *Lynx*, have a similar distribution, except they do not occur in South America. The bears, *Euarctos*; raccoons, *Procyon*; and squirrels, *Sciurus* are represented by other species in other parts of the Americas, Asia and Europe. Genera of our mammals which occur only in North America, Europe and Asia are those for the wolf, *Canis*; the beaver, *Castor*; moles, *Scalopus*; and a long-tailed shrew, *Sorex*. Genera which occur only in the Americas include those for the opossum, *Didelphis*; a short-tailed shrew, *Cryptotis*; harvest mouse, *Reithrodontomys*; rice rat, *Oryzomys*; cotton rat, *Sigmodon*; cotton-tails and marsh rabbits, *Sylvilagus*; and deer, *Odocoileus*. Genera restricted to North America are those for a short-tailed shrew, *Blarina*; striped and spotted skunks, *Mephitis* and *Spilogale*; flying squirrel, *Glaucomys*; pocket

gopher, *Geomys*; round-tailed muskrat, *Neofiber*; and deer mouse, *Peromyscus*. The Florida deer mouse, *Peromyscus floridanus* and the spotted skunk, *Spilogale ambarvalis* are found only in peninsular Florida. *Neofiber alleni* is almost in this class, but one of its sub-species has strayed into the Okefenokee Swamp of southern Georgia. There is also a Pleistocene record for this genus from Kansas.

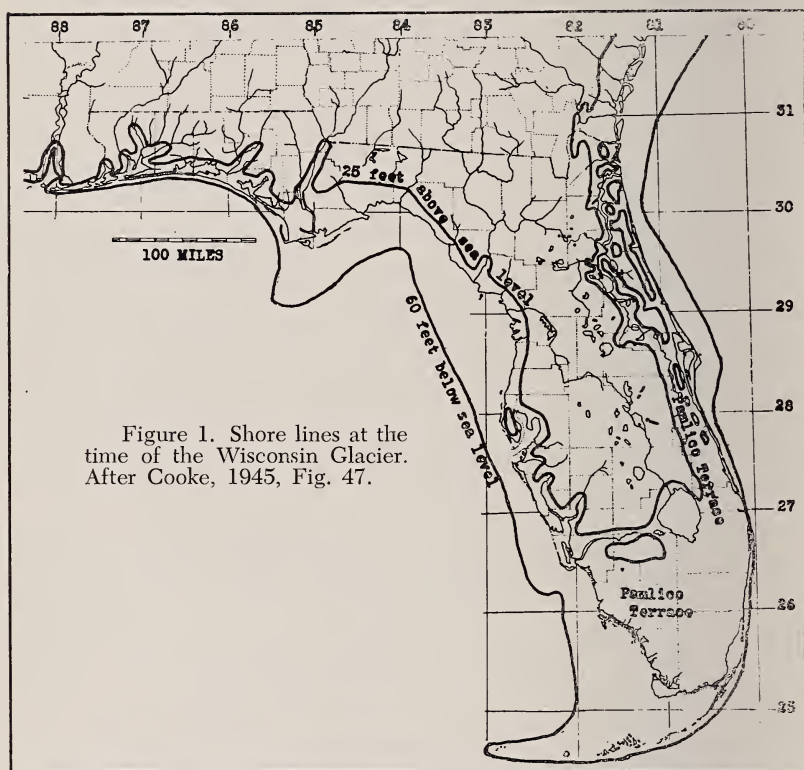


Figure 1. Shore lines at the time of the Wisconsin Glacier. After Cooke, 1945, Fig. 47.

In addition to the species just mentioned, many sub-species or geographic races are confined to the state. The geological history of this part of the world during the Pleistocene undoubtedly played an important part in the differentiation of these populations. During early Pleistocene times, sea level was relatively low, perhaps 300 feet below that of the present age, according to Cooke's *Geology of Florida*, 1945. This greatly increased the land area of this region. However, the melting of the Nebraskan Glacier swelled

the oceans to such an extent that nearly the entire state was submerged. Some islands remained in the northeastern part and others east of Tampa Bay. One of the latter, near Lake Wales, has an elevation above sea level of more than 320 feet and is the site of Bok Tower. Three other glacial stages, the Kansan, Illinoian and Wisconsin, followed the Nebraskan with other great fluctuations in sea level. However, later fluctuations were not so great as those of early Pleistocene. Apparently at the beginning of the formation of the Wisconsin Glacier, our shore line was about 25 feet higher than at present and now forms the edge of the Pamlico Terrace. This old shore line is now well preserved in many places. Evaporation of water from the oceans to form the Wisconsin Glacier caused the shore line to drop perhaps as much as 60 feet below the recent one, which was formed by the melting of that glacier. An approximation of the positions of these shore lines is given in Figure 1. With the rise in sea level many islands were formed, as a result of which their terrestrial populations were geographically isolated. It is estimated that our present shore line is about 25,000 years old.

Examples of subspecies which probably developed on the Florida keys at the southern tip of the state, with the aid of geographical isolation, are the following:

*Procyon lotor inesperatus* Nelson, Matecumbe raccoon.

*Procyon lotor auspicatus* Nelson, Key Vaca raccoon.

*Procyon lotor incautus* Nelson, Torch Key raccoon.

*Sciurus carolinensis matecumbei* H. H. Bailey, Key Largo gray squirrel.

*Peromyscus gossypinus allapaticola* Schwartz, Key Largo cotton mouse.

*Sigmodon hispidus exputus* G. M. Allen, Pine Key cotton rat.

*Neotoma floridana smalli* Sherman, Key Largo wood rat.

*Odocoileus virginianus clavium* Barbour and Allen, Key deer.

The eight races of *Peromyscus polionotus* which occur in the state furnish other examples of differentiation of sub-species. The oldfield mouse, *P. p. subgriseus* occurs in sandy old fields of the northern part of the peninsula. In the region of the Ocala National Forest it intergrades with *P. p. rhodsi*, a race which also lives in old fields almost as far south as Lake Okechobee. Possibly these two races differentiated rather early in Pleistocene times, but not to such an extent as to prevent interbreeding. As sand dunes de-

veloped some of these old field mice became so addicted to them that now they are found on sand dunes almost altogether and their geographical range is usually less than a mile wide. The color of these beach mice closely matches that of the sand of their habitat. This suggests that selection was brought about by the capture by predators of mice which did not have good protective coloration. One race, *P. p. niveiventris* occurs where dunes are well formed from Miami to New Smyrna Beach. Another race, *P. p. decoloratus* replaces it at Ponce de Leon Inlet. A third race, *P. p. phasma* occurs on Anastasia Island and the adjacent mainland half way to Jacksonville Beach. Similarly in west Florida, *P. p. albifrons* is another old field mouse whose range extends into southern Alabama and Georgia. It also apparently gave rise to races which are confined to sand dunes. *P. p. peninsularis* occurs in the vicinity of Panama City and *P. p. leucocephalus* lives on Santa Rosa Island.

When Howell described *leucocephalus* in 1920, he gave it full specific rank, since it was well marked and isolated from its relatives on the mainland by Santa Rosa Sound. However, by 1932 Sumner had amply demonstrated by means of breeding experiments in the laboratory that *leucocephalus* and *albifrons* readily interbreed and produce fertile offspring. He also indicated how the characters which serve to define these races are inherited. Consequently *leucocephalus* has since been listed as a subspecies.

Possibly the Pleistocene island on the Pinellas Peninsula west of Tampa Bay, is the area where *Peromyscus polionotus rhoadsi* differentiated. A mole, *Scalopus aquaticus parvus* is confined to this region and even a race of big brown bat, *Eptesicus fuscus osceola* occurs in this area, but is unknown in the northern part of the state. Its close relative, *Eptesicus fuscus fuscus* is common in the eastern United States, but rarely is found as far south as the Georgia-Florida boundary.

Another race of bat, Rhoad's myotis, *Myotis austroriparius austroriparius* is the one most often found in the numerous caves which are scattered from Florida Caverns State Park near Marianna south-eastward, half the length of the peninsula, through Citrus County. Other subspecies of *Myotis austroriparius* range as far west as Arkansas and as far north as Illinois. Such a geographical distribution is fairly typical of that of many races of mammals which are now native to Florida.



In addition to the isolation produced in Pleistocene times by changes in sea level the peninsula undoubtedly provides partial isolation to terrestrial mammals. Most of the small mammals, which have been studied in this regard, do not travel more than a few miles from the place of birth. Consequently the effects of interbreeding of those which live at opposite ends of the peninsula must be filtered through many generations. As a result an area of intergradation often exists where individuals are found in which characters of both races are intermingled in various ways. This example implies continuous favorable habitats for long distances over long periods of time. The details of what now constitutes a favorable habitat, its extent and its mammal inhabitants have been critically studied in only a few areas in the state. In fact the collector's "blind spots" are still being discovered as evidenced by the fact that in the following list of recent mammals eleven new races are cited which have been described since the 1952 list went to press.

It is obvious from these brief remarks that our present knowledge of the biotic relations of the Florida mammal fauna presents many challenging problems.

#### RECENT MAMMALS OF FLORIDA

Order Marsupialia.—Opossums, pouched mice, kangaroos, phalang-ers, wombats, etc.

Family Didelphidae.—Opossums.

*Didelphis marsupialis pigra* Bangs, 1898. Florida opossum.

Order Insectivora.—Shrews, moles, hedgehogs, tenrecs, etc.

Family Soricidae.—Shrews.

*Sorex longirostris longirostris* Bachman, 1837. Bachman's shrew.

*Cryptotis floridana* (Merriam), 1895. Florida short-tailed shrew.

*Blarina brevicauda carolinensis* (Bachman), 1837. Carolina short-tailed shrew.

*Blarina brevicauda peninsulae* Merriam, 1895. Everglades short-tailed shrew.

*Blarina brevicauda shermani* Hamilton, 1955. Blind spot shrew.

Family Talpidae.—Moles.

*Scalopus aquaticus howelli* Jackson, 1914. Howell's mole.

*Scalopus aquaticus australis* (Chapman), 1893. Florida mole.  
*Scalopus aquaticus anastasiae* (Bangs), 1898. Anastasia Island mole.

*Scalopus aquaticus parvus* (Rhoads), 1894. Little mole.

*Scalopus aquaticus bassi* A. H. Howell, 1939. Bass's mole

*Scalopus aquaticus porteri* Schwartz, 1952. Porter's mole.

# Order Chiroptera.—Bats.

Family Phyllostomidae.—American fruit bats, leaf-nosed bats, nectar feeders, etc.

*Artibeus jamaicensis parvipes* Rehn, 1902. American fruit-eating bat.

Family Vespertilionidae.—Includes most boreal species of bats.

*Myotis austroriparius austroriparius* (Rhoads), 1897. Rhoad's myotis.

*Myotis grisescens* A. H. Howell, 1909. Gray bat.

*Myotis keeni septentrionalis* (Trouessart), 1897. Keen bat.

*Myotis sodalis* Miller and Allen 1928. Indiana myotis.

*Pipistrellus subflavus subflavus* (F. Cuvier), 1832. Eastern Pipistrel.

*Eptesicus fuscus osceolus* Rhoads, 1902. Florida big brown bat.

*Lasiurus borealis borealis* (Muller), 1776. Red bat.

*Lasiurus seminolus* (Rhoads), 1895. Seminole bat.

*Lasiurus cinereus* (Beauvois), 1796. Hoary bat.

*Dasypterus floridanus* Miller, 1902. Yellow bat.

*Nycticeius humeralis humeralis* (Rafinesque), 1818. Evening bat.

*Nycticeius humeralis subtropicalis* Schwartz, 1951. Southern evening bat.

*Corynorhinus rafinesqui rafinesqui* (Lesson), 1818. Long-eared bat.

Family Molossidae.—Free-tailed bats.

*Tadarida brasiliensis cynocephala* (Le Conte), 1831. Le Conte free-tailed bat.

*Eumops glaucinus* (Wagner), 1843. Glaucous free-tailed bat.

# Order Primates.—Lemurs, aye ayes, pottos, monkeys, marmosets, baboons, apes, men.

Family Hominidae.—Men.

*Homo sapiens* Linnaeus, 1758. Men.

Order Edentata.—Glyptodonts, sloths, ant bears, armadillos, etc.

Family Dasypodidae.—Armadillos.

*Dasypus novemcinctus mexicanus* Peters, 1864. Texas or nine-banded armadillo.

Order Lagomorpha.—Pikas, hares, rabbits, cottontails, etc.

Family Leporidae.—Hares, rabbits, cottontails, etc.

*Sylvilagus floridanus floridanus* (J. A. Allen), 1890. Florida cottontail.

*Sylvilagus floridanus ammophilus* A. H. Howell, 1939. Beach cottontail.

*Sylvilagus floridanus mallurus* (Thomas), 1898. Eastern cottontail.

*Sylvilagus floridanus paulsoni* Schwartz, 1956. South Florida cottontail.

*Sylvilagus palustris palustris* (Bachman), 1837. Carolina marsh rabbit.

*Sylvilagus palustris paludicola* (Miller and Bangs), 1894. Florida marsh rabbit.

Order Rodentia.—Squirrels, pocket gophers, beavers, porcupines, rats, mice, etc.

Family Sciuridae.—Tree, ground, flying squirrels, etc.

*Sciurus carolinensis carolinensis* Gmelin, 1788. Southern gray squirrel.

*Sciurus carolinensis extimus* Bangs, 1896. Everglades gray squirrel.

*Sciurus carolinensis matecumbei* H. H. Bailey, 1937. Key Largo gray squirrel.

*Sciurus niger niger* Linnaeus, 1758. Southern fox squirrel.

*Sciurus niger avicennia* A. H. Howell, 1919. Mangrove fox squirrel.

*Sciurus niger shermani* Moore, 1956. Central Florida fox squirrel.

*Glaucomys volans saturatus* A. H. Howell, 1915. Southeastern flying squirrel.

*Glaucomys volans querceti* (Bangs), 1896. Florida flying squirrel.

Family Geomyidae.—Pocket gophers.

*Geomys pinetis mobilensis* Merriam, 1895. Alabama pocket gopher.

*Geomys pinetis austrinus* Bangs, 1898. Southeastern pocket gopher.

*Geomys pinetis floridanus* (Audubon and Bachman), 1854. St. Augustine pocket gopher.

*Geomys pinetis goffi* Sherman, 1944. Goff's pocket gopher.

Family Castoridae.—Beavers.

*Castor canadensis carolinensis* Rhoads, 1898. Carolina beaver.

Family Cricetidae.—New World rats and mice.

*Oryzomys palustris palustris* (Harlan), 1837. Eastern rice rat.

*Oryzomys palustris natator* Chapman, 1893. Central Florida rice rat.

*Oryzomys palustris coloratus* Bangs, 1898. Everglades rice rat.

*Oryzomys palustris planirostris* Hamilton, 1955. Pine Island rice rat.

*Oryzomys palustris sanibeli* Hamilton, 1955. Sanibel Island rice rat.

*Reithrodontomys humulis humulis* (Audubon and Bachman), 1841. Eastern harvest mouse.

*Peromyscus polionotus subgriseus* (Chapman), 1893. Florida old field mouse.

*Peromyscus polionotus rhoadsi* (Bangs), 1898. Rhoads' old field mouse.

*Peromyscus polionotus niveiventris* (Chapman), 1889. Micco beach mouse.

*Peromyscus polionotus decoloratus* Howell, 1939. Pallid beach mouse.

*Peromyscus polionotus phasma* (Bangs), 1898. Anastasia beach mouse.

*Peromyscus polionotus albifrons* Osgood, 1909. White-fronted beach mouse.

*Peromyscus polionotus peninsularis* Howell, 1939. St. Andrews beach mouse.

*Peromyscus polionotus leucocephalus* A. H. Howell, 1920. White-headed beach mouse.

*Peromyscus gossypinus gossypinus* (Le Conte), 1853. Cotton mouse.

*Peromyscus gossypinus palmarius* Bangs, 1896. Florida cotton mouse.

*Peromyscus gossypinus anastasiae* Bangs, 1898. Anastasia cotton mouse.



- Peromyscus gossypinus restrictus* A. H. Howell, 1939. Chadwick Beach cotton mouse.
- Peromyscus gossypinus telmaphilus* Schwartz, 1952. Royal Palm Hammock cotton mouse.
- Peromyscus gossypinus allapaticola* Schwartz, 1952. Key Largo cotton mouse.
- Peromyscus nuttalli aureolus* (Audubon and Bachman), 1841. Southern golden mouse.
- Peromyscus floridanus* (Chapman), 1889. Florida white-footed mouse.
- Sigmodon hispidus hispidus* Say and Ord, 1825. Northern cotton rat.
- Sigmodon hispidus littoralis* Chapman, 1889. East Coast cotton rat.
- Sigmodon hispidus spadicipygus* Bangs, 1898. Cape Sable cotton rat.
- Sigmodon hispidus exputus* G. M. Allen, 1920. Pine Key cotton rat.
- Sigmodon hispidus floridanus* A. H. Howell, 1943. Central Florida cotton rat.
- Sigmodon hispidus insulicola* A. H. Howell, 1943. Captiva Island cotton rat.
- Neotoma floridana floridana* (Ord), 1818. Florida woodrat.
- Neotoma floridana smalli* Sherman, 1955. Key Largo woodrat.
- Pitymys parvulus* A. H. Howell, 1916. Florida pine mouse.
- Neofiber alleni alleni* True, 1884. Central Florida water rat.
- Neofiber alleni apalachicola* Schwartz, 1953. Apalachicola water rat.
- Neofiber alleni nigrescens* A. H. Howell, 1920. Okechobee water rat.
- Neofiber alleni struix* Schwartz, 1952. South Florida water rat.
- Family Muridae.—Old World rats and mice.
- Rattus rattus rattus* (Linnaeus), 1758. Black rat.
- Rattus rattus alexandrinus* (Geoffroy), 1803. Roof rat.
- Rattus rattus frugivorus* (Rafinesque), 1814. Fruit rat.
- Rattus norvegicus* (Erxleben), 1777. Norway rat.
- Mus musculus domesticus* Ratty, 1772. House mouse.
- Mus musculus brevirostris* Waterhouse 1837. Southern house mouse.

Order Carnivora.—Dogs, bears, raccoons, weasels, hyenas, cats, etc.

Family Canidae.—Dogs, wolves, foxes, etc.

*Canis niger niger* (Bartram), 1791. Florida wolf.

*Urocyon cinereoargenteus floridanus* Rhoads, 1895. Florida gray fox.

Family Ursidae.—Bears.

*Euarctos americanus floridanus* (Merriam), 1896. Florida black bear.

Family Procyonidae.—Raccoons, cacomistles, coatis, kinkajous, pandas, etc.

*Procyon lotor elucus* Bangs, 1898. Florida raccoon.

*Procyon lotor varius* Nelson and Goldman, 1930. Alabama raccoon.

*Procyon lotor inesperatus* Nelson, 1930. Matecumbe raccoon.

*Procyon lotor auspicatus* Nelson, 1930. Key Vaca raccoon.

*Procyon lotor incautus* Nelson, 1930. Torch Key raccoon.

*Procyon lotor marinus* Nelson, 1930. Chokoloskee raccoon.

Family Mustelidae.—Weasels, martens, wolverines, skunks, otters, badgers, etc.

*Mustela frenata olivacea* Howell, 1913. Alabama weasel.

*Mustela frenata peninsulæ* (Rhoads), 1894. Florida weasel.

*Mustela vison lutensis* (Bangs), 1898. Florida mink.

*Mustela vison evergladensis* Hamilton, 1948. Everglades mink.

*Mephitis mephitis elongata* (Bangs), 1895. Florida striped skunk.

*Spilogale putorius* (Linnaeus), 1758. Alleghenian spotted skunk.

*Spilogale ambarvalis* Bangs, 1898. Florida spotted skunk.

*Lutra canadensis vaga* (Bangs), 1898. Florida otter.

Family Felidae.—Cats, pumas, jaguarundis, lions, tigers, etc.

*Felis concolor coryi* Bangs, 1899. Florida puma.

*Lynx rufus floridanus* (Rafinesque), 1817. Florida bobcat.

Order Artiodactyla.—Pigs, peccaries, hippopotamuses, camels, deer, giraffes, cows, etc.

Family Cervidae.—Deer, elk, sambar, moose, reindeer, etc.

*Odocoileus virginianus virginianus* (Boddaert), 1784. Virginia deer.

*Odocoileus virginianus osceolus* (Bangs), 1896. Florida white-tailed deer.

*Odocoileus virginianus seminolus* Goldman and Kellog, 1940.  
Seminole deer.

*Odocoileus virginianus clavium* Barbour and Allen, 1922. Key deer.

Order Pinnipedia.—Seals, sea lions, elephant seals, walruses.

Family Phocidae.—Seals.

*Monachus tropicalis* (Gray) 1850. Monk seal.

*Cystophora cristata* (Erxleben), 1777. Hooded seal.

Order Cetacea.—Whales, dolphins, porpoises, etc.

Family Ziphiidae.—Beaked whales.

*Mesoplodon europaeus* (Gervais), 1848-52. Gervais' whale.

*Ziphius cavirostris* G. Cuvier, 1823. Cuvier's beaked whale.

Family Physeteridae.—Sperm whales.

*Physeter catodon* Linnaeus, 1758. Cachalot or sperm whale.

*Kogia breviceps* (Blainville), 1838. Pygmy sperm whale.

Family Delphinidae.—Porpoises, dolphins, killer whales, black-fish, etc.

*Globicephala macrorhyncha* (Gray), 1846. Pilot whale, black fish, etc.

*Steno rostrata* Gray, 1846. Rough-toothed dolphin.

*Stenella plagiodon* (Cope), 1866. Spotted dolphin.

*Stenella frontalis* (G. Cuvier), 1829. Bridled dolphin.

*Stenella longirostris* (Gray), 1828. Long-beaked dolphin.

*Delphinus delphis* Linnaeus, 1758. Common dolphin.

*Tursiops truncatus* (Montague), 1821. Bottle-nosed dolphin.

*Grampus orca* (Linnaeus), 1758. Killer whale.

*Pseudorca crassidens* (Owen), 1846. False killer.

Family Balaenopteridae.—Whalebone whales.

*Balaenoptera physalis* (Linnaeus), 1758. Finback.

*Balaenoptera borealis* Lesson, 1828. Sei whale, Pollack whale, etc.

*Balaenoptera acutorostrata* Lacepede, 1804. Pike whale.

*Megaptera nodosa* (Bonaterre), 1789. Humpbacked whale.

Family Balaenidae.—Whalebone whales.

*Eubalaena glacialis* (Bonaterre), 1789. North Atlantic right whale.

## PERTINENT LITERATURE

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